Upsilon R_{AA} in sPHENIX

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Assumptions

- Expected* number of Upsilons in 10B 0-10% most central Au+Au = 15880 (all 3 states)
- Expected* number of Upsilons in 7350B p+p = 13480
- eID efficiency = **0.7** (used in the Proposal) and 0.9
- Backgrounds in Au+Au calculated in my presentation on Sept. 6, 2016
- Stat. error in p+p = $\sqrt{N}$ (no background)
- Upsilon p_T and rapidity distributions from *PHG4ParticleGeneratorVectorMeson* event generator (see next slide)
- Upsilon R_{AA} = **1.0** (used in the Proposal) and 0.5**

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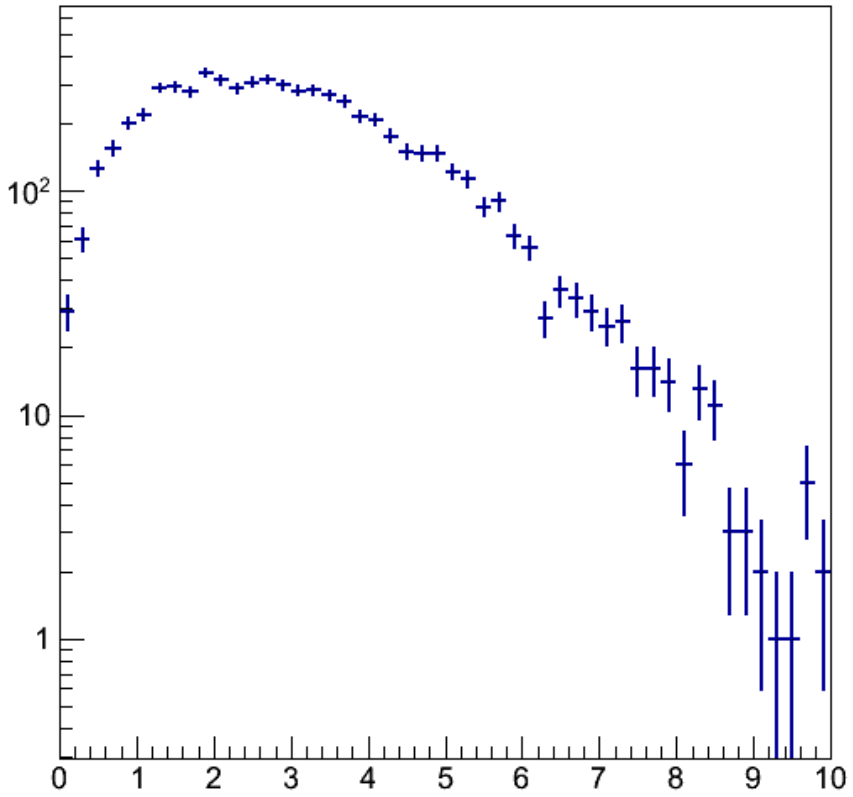
* sPHENIX Proposal, based on measured by PHENIX $Bd\sigma/dy = 108 \pm 38(stat) \pm 15 (sys)$ pb

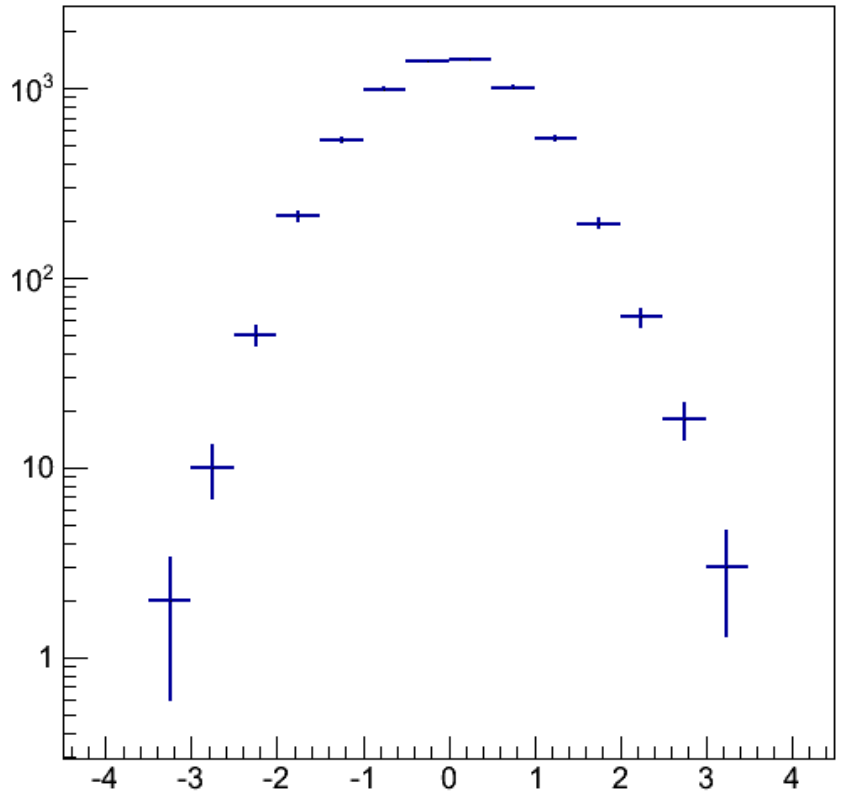
** PHENIX measured $R_{AA} = 0.50 \pm 0.18(stat) \pm 0.11 (sys)$
(A.Adare et al., (PHENIX Collaboration) Phys. Rev. C91 024913; arXiv 1404.2246v3)

Upsilon p_T and rapidity distributions

Upsilon p_T and rapidity distributions from *PHG4ParticleGeneratorVectorMeson* event generator (PYTHIA? Ramona Vogt?)



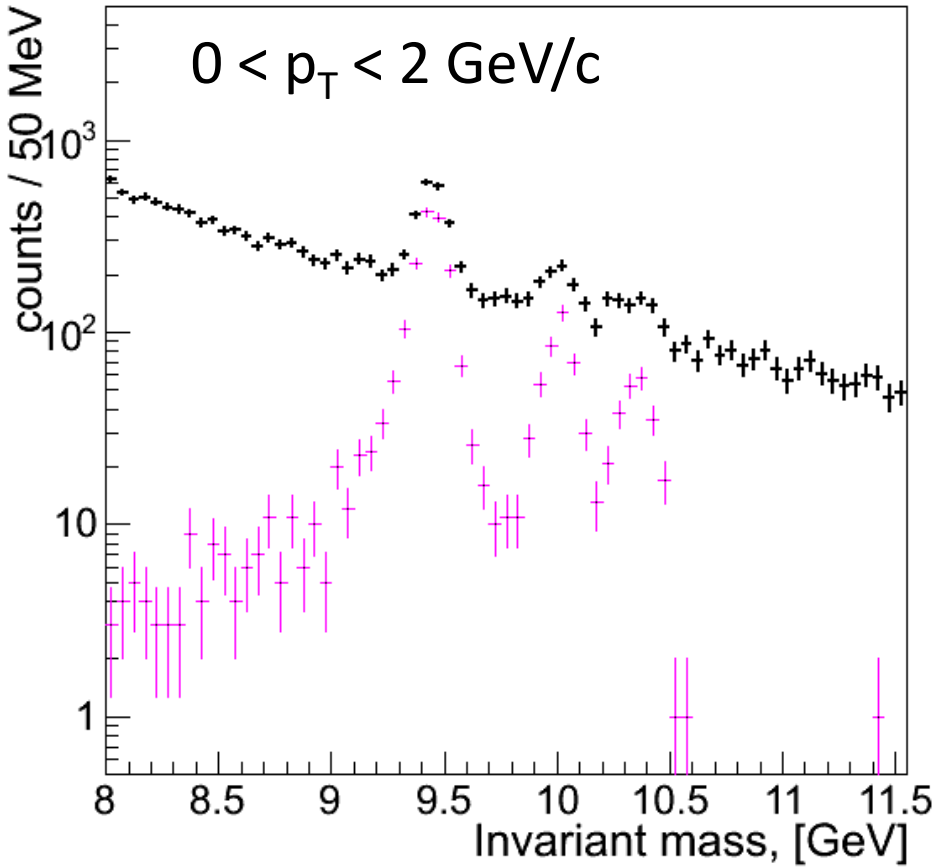
Transverse momentum [GeV/c]

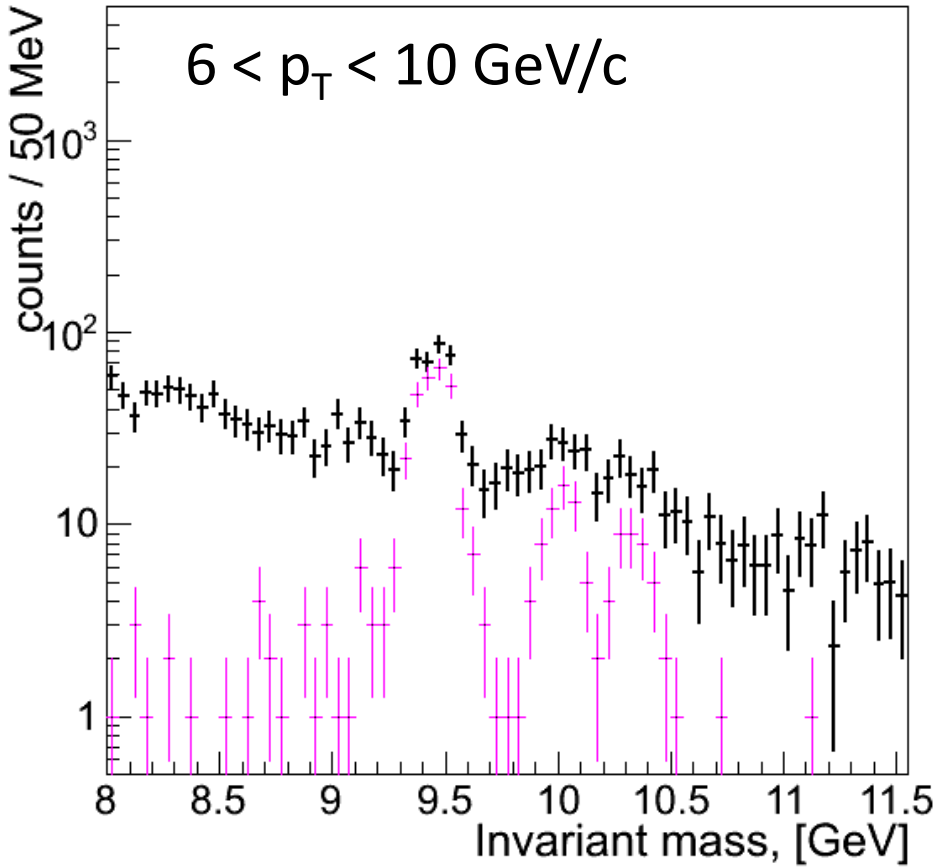


Rapidity

Expected inv. mass in Au+Au vs. p_T

Signal/Background ratio is 0.5-1 for Upsilon(1S)
Same R_{AA} = 1.0 for all 3 states, eID = 0.7

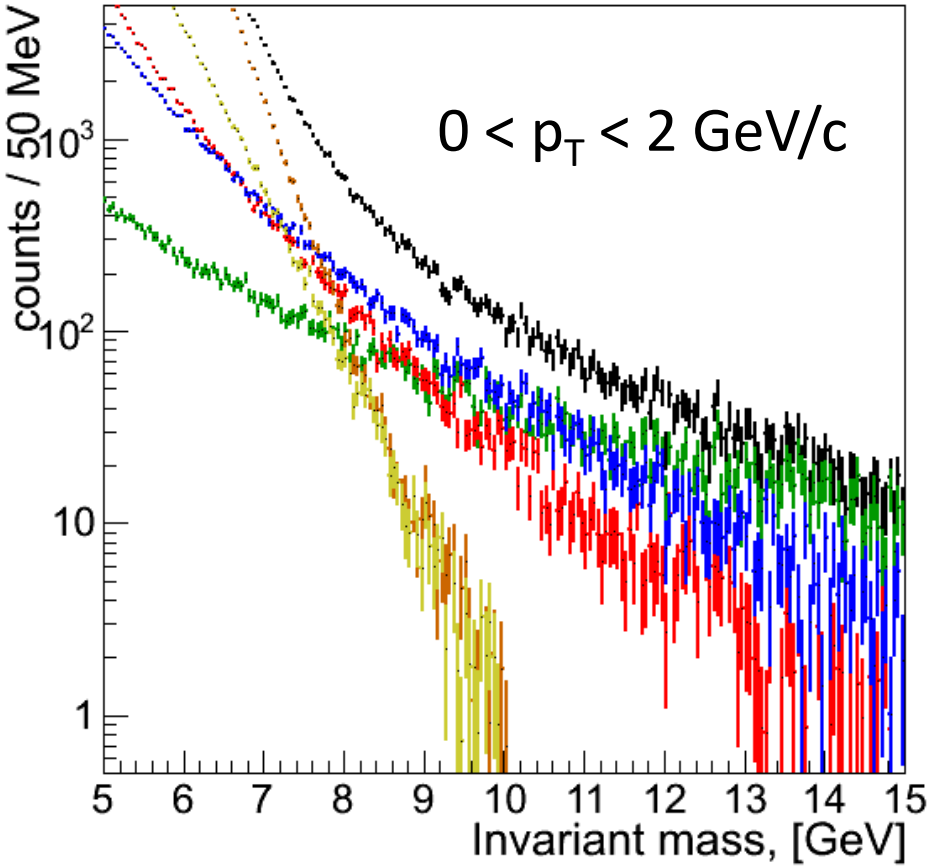


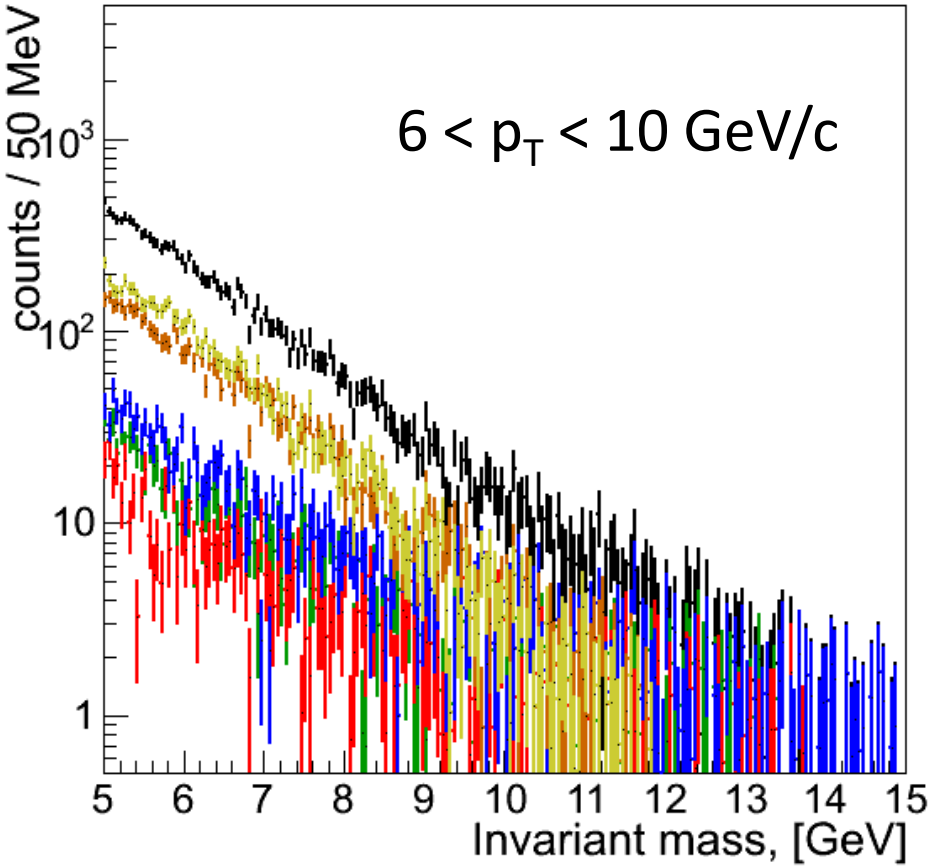


Count Upsilons(1S) and in inv. mass range: 9.1-9.6 GeV

Background components in Au+Au vs. p_T (eID=0.7)

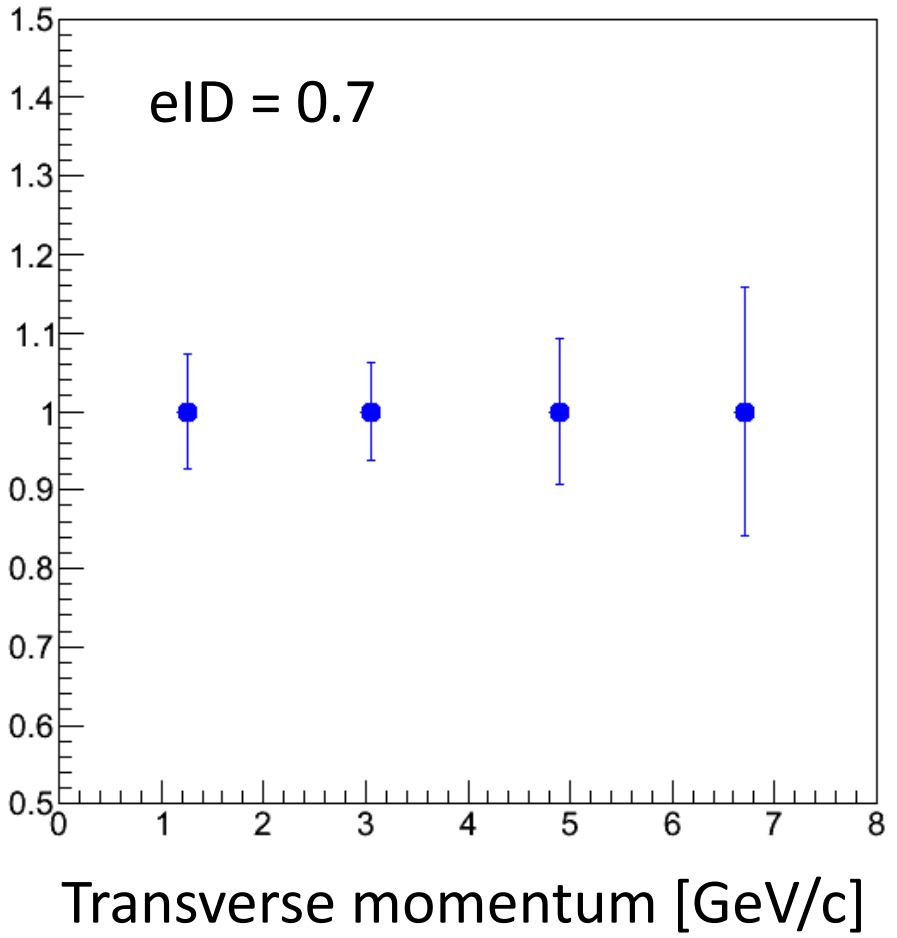
Yellow: fake e - fake e; Brown: fake e - HF;
Green: Drell-Yan; Red: Correlated charm; Blue: correlated bottom





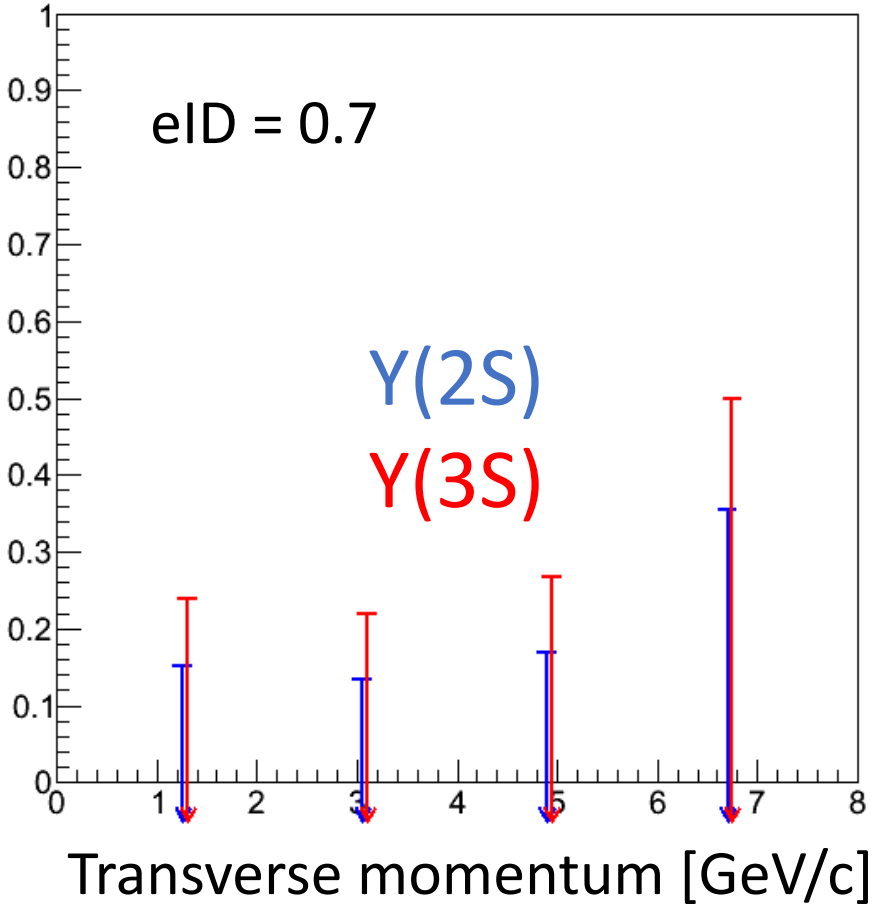
Expected uncertainty for Y(1S) R_{AA}

Statistical uncertainty only.



Expected uncertainty for Y(2S) & Y(3S) R_{AA}

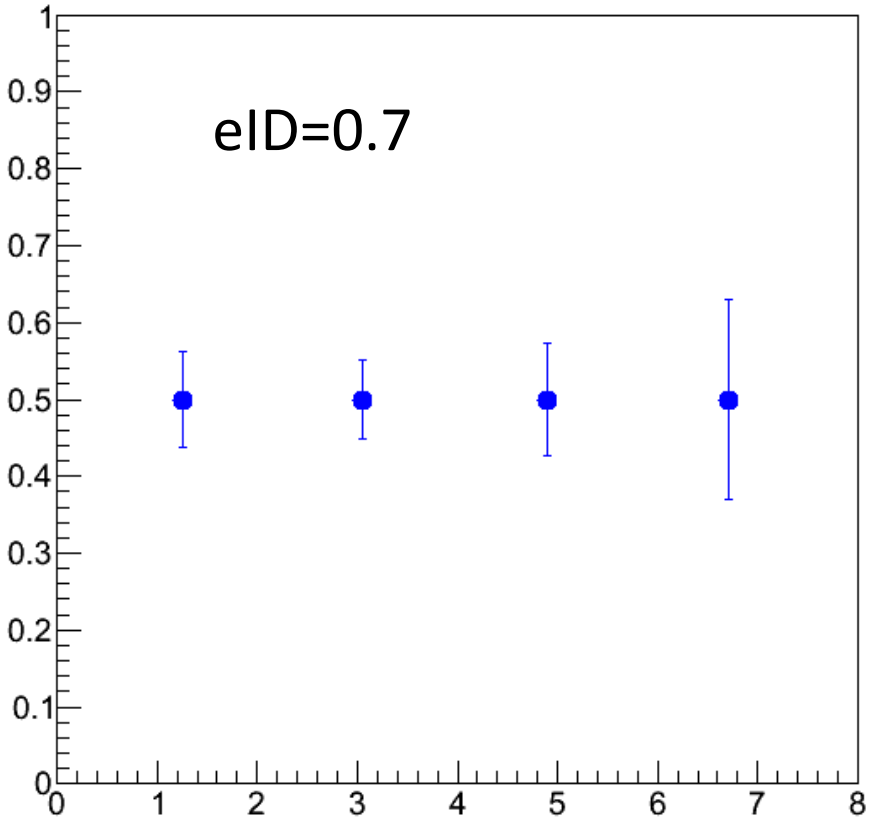
Y(2S) and Y{3S) are supposed to be suppressed stronger than 1S state, and have lower statistics. Calculate 95% upper limit on R_{AA} in case we don't see a signal.

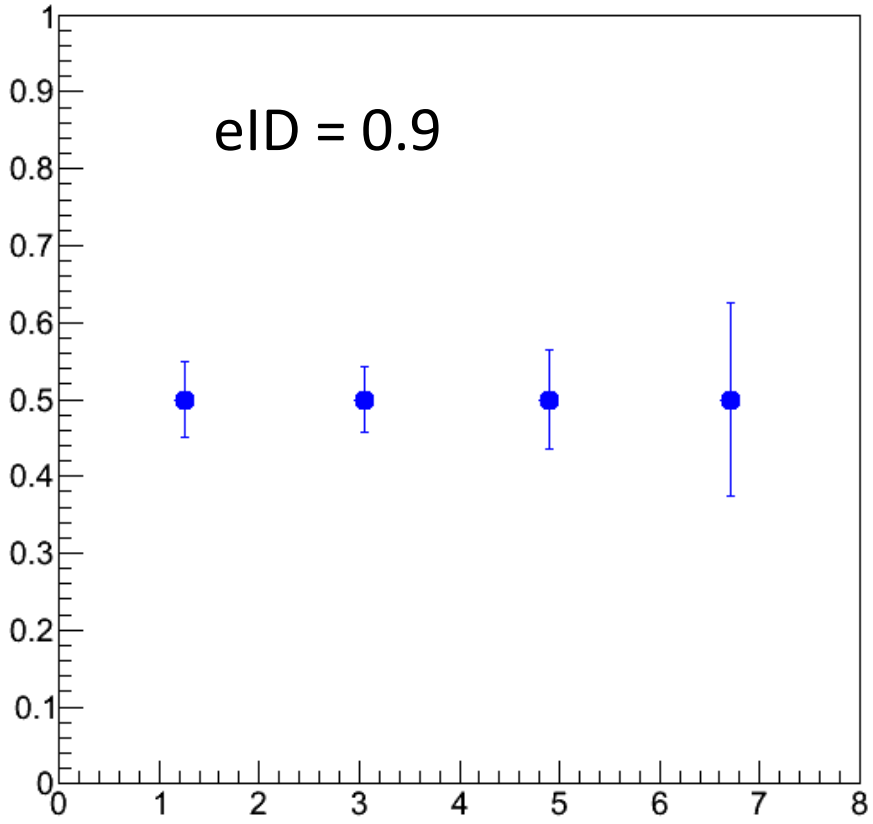


If Y(2S) R_{AA} is larger than ~0.15, we should be able to see a peak.

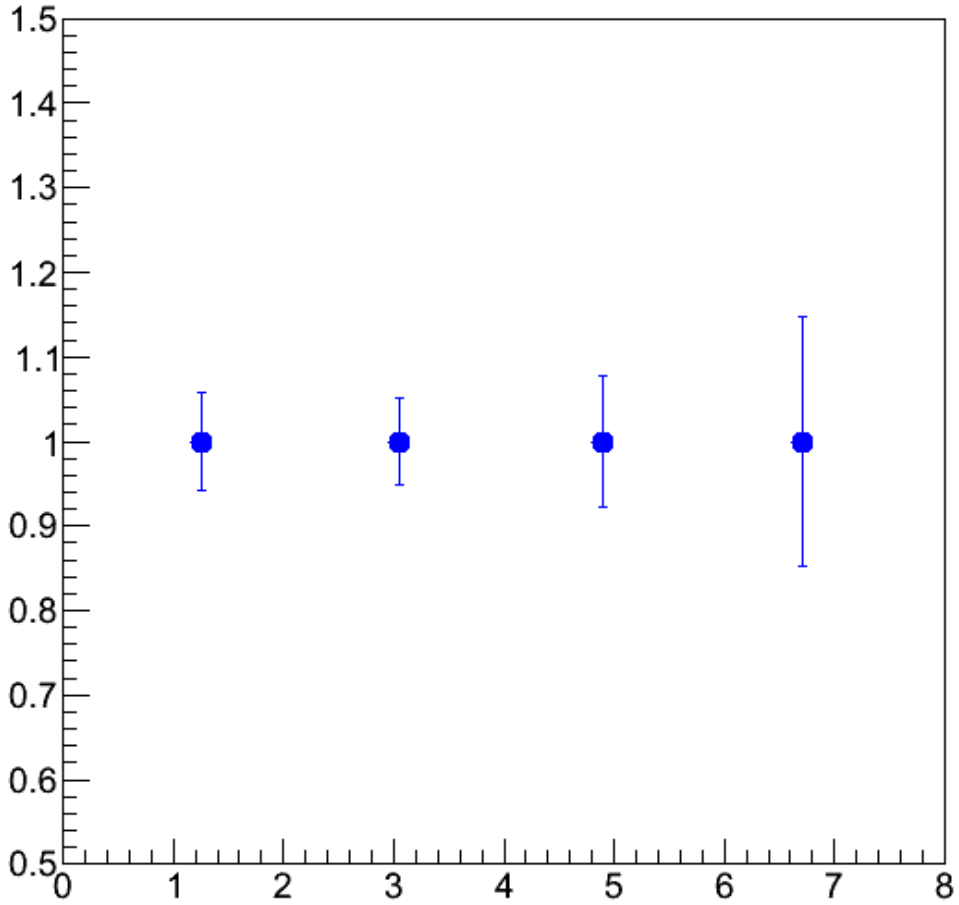
Back Up Slides

Y(1S) R_{AA} = 0.5


eID=0.7
Transverse momentum [GeV/c}

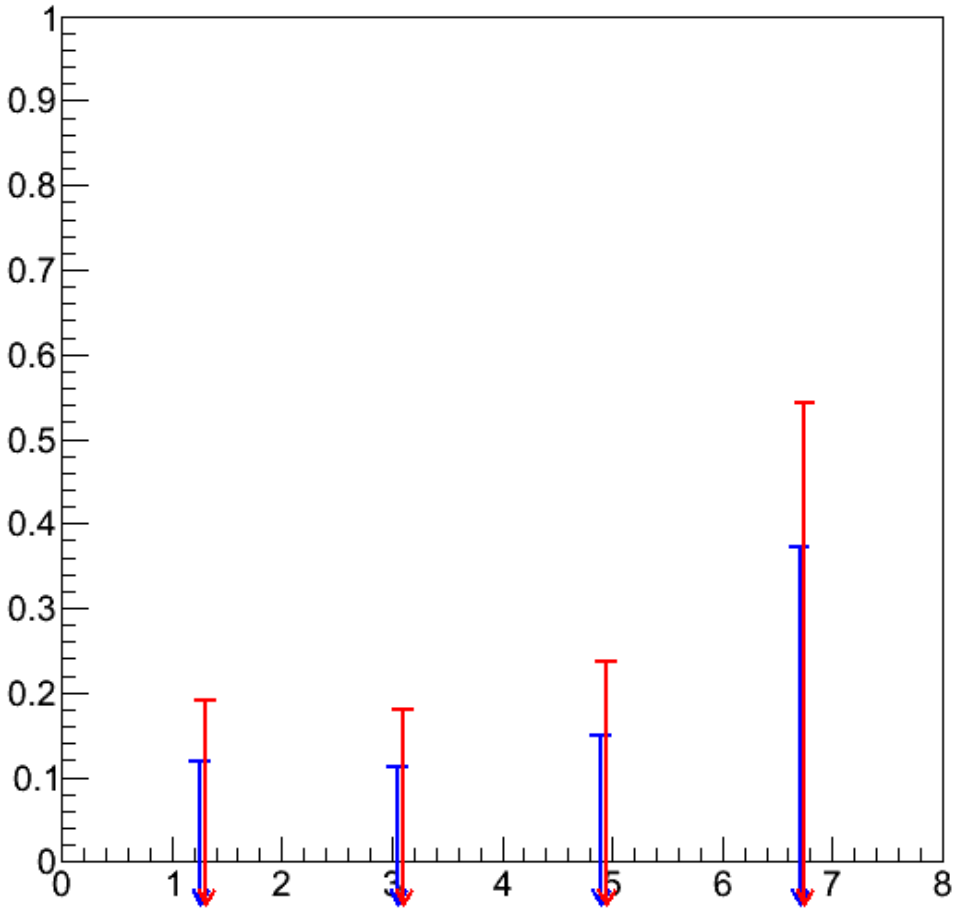

eID = 0.9
Transverse momentum [GeV/c}

Y(1S) R_{AA} = 1.0 eID = 0.9



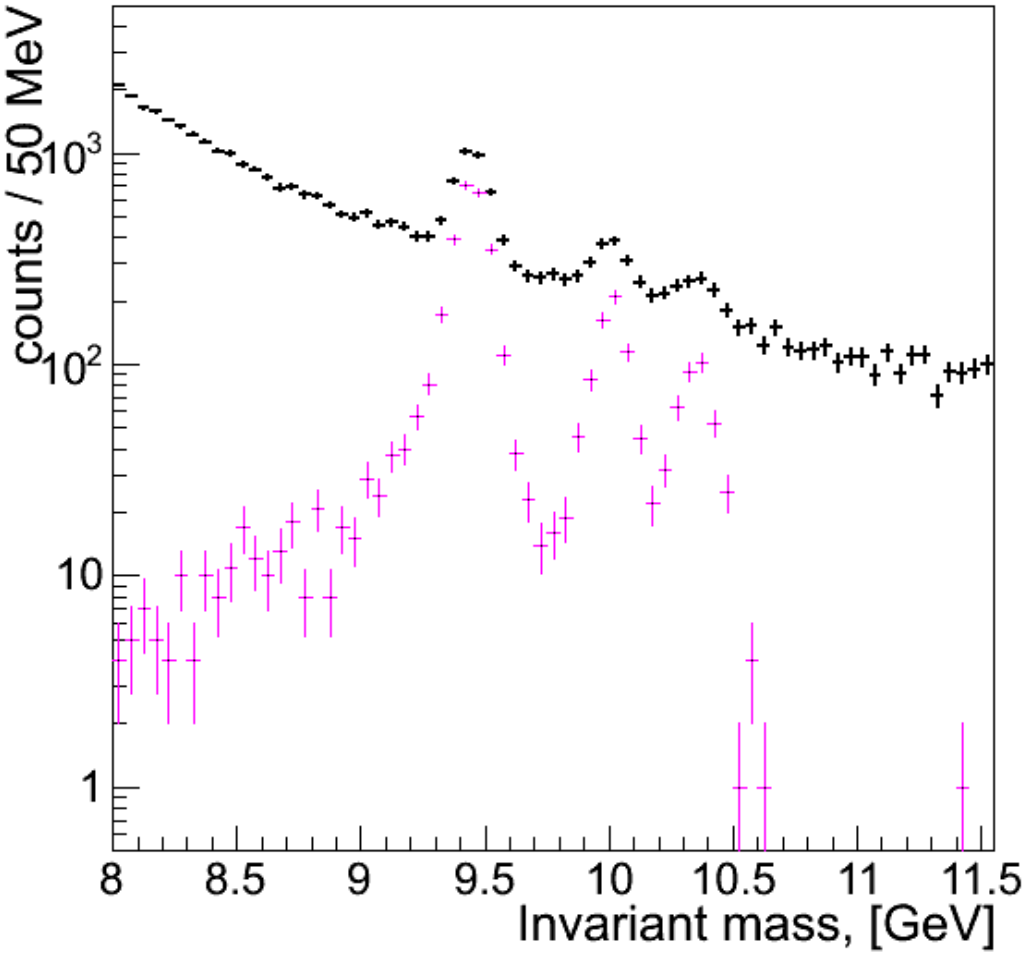
Transverse momentum [GeV/c}

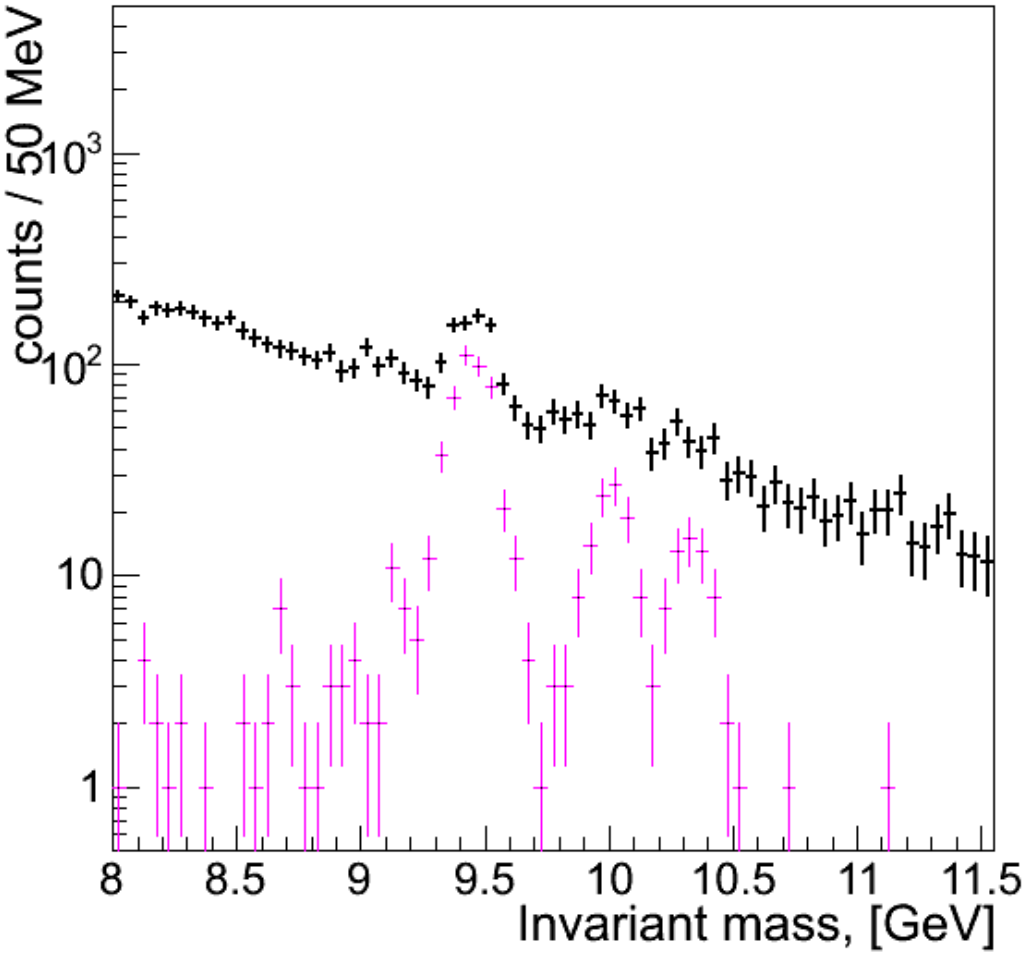
Y(2S & 3S) eID = 0.9



Transverse momentum [GeV/c}

R_{AA} = 1.0 inv. mass plots (eID = 0.9)





Y(1S) R_{AA} = 0.5 eID = 0.7